

## § 108.429

(b) A cutoff valve and check valve for each connection; and

(c) Facilities available enabling the connection to be used on either side of the unit.

[CGD 73-251, 43 FR 56808, Dec. 4, 1978, as amended by CGD 88-032, 56 FR 35826, July 29, 1991]

### § 108.429 Fire main system protection.

(a) Each pipe and fire hydrant in a fire main system must be installed to the extent practicable in locations that are not exposed to damage by materials that are moved on or onto the deck.

(b) Each part of the fire main system located on an exposed deck must either be protected against freezing or be fitted with cutout valves and drain valves to shut off and drain the entire exposed system in freezing weather.

#### AUTOMATIC SPRINKLING SYSTEMS

### § 108.430 General.

Automatic Sprinkler Systems shall comply with NFPA 13-1996.

[CGD 95-028, 62 FR 51208, Sept. 30, 1997]

#### FIXED CARBON DIOXIDE FIRE EXTINGUISHING SYSTEMS

### § 108.431 Carbon dioxide systems: General.

(a) Sections 108.431 through 108.457 apply to high pressure carbon dioxide fire extinguishing systems.

(b) Low pressure systems, that is, those in which the carbon dioxide is stored in liquid form at low temperature, must be approved by the Com-mandant.

(c) Each carbon dioxide system cylinder must be fabricated, tested, and marked in accordance with §§ 147.60 and 147.65 of this chapter.

[CGD 73-251, 43 FR 56808, Dec. 4, 1978, as amended by CGD 84-044, 53 FR 7749, Mar. 10, 1988]

### § 108.433 Quantity of CO<sub>2</sub>: General.

Each CO<sub>2</sub> system must have enough gas to meet the quantity requirements of § 108.439 for the space requiring the greatest amount of CO<sub>2</sub>.

## 46 CFR Ch. I (10-1-99 Edition)

### § 108.437 Pipe sizes and discharge rates for enclosed ventilation systems for rotating electrical equipment.

(a) The minimum pipe size for the initial charge must meet table 108.441 and the discharge of the required amount of CO<sub>2</sub> must be completed within 2 minutes.

(b) The minimum pipe size for the delayed discharge must be at least 1.25 centimeters (½ inch) standard pipe.

(c) The pipe used for the initial discharge must not be used for the delayed discharge, except systems having a volume of less than 57 cubic meters (2,000 cubic feet).

### § 108.439 Quantity of CO<sub>2</sub> for protection of spaces.

(a) The number of pounds of CO<sub>2</sub> required to protect a space must be equal to the gross volume of the space divided by the appropriate factor from Table 108.439.

(b) If a machinery space includes a casing, the gross volume of the space may be calculated using the reductions allowed in 46 CFR 95.10-5(e).

(c) If fuel can drain from a space to an adjacent space or if two spaces are not entirely separate, the requirements for both spaces must be used to determine the amount of CO<sub>2</sub> to be provided and the CO<sub>2</sub> system must be arranged to discharge into both spaces simultaneously.

TABLE 108.439—CO<sub>2</sub> Supply Factors

[Gross volume of space in cubic feet]

Over	Not over	Factor
0 .....	500	15
500 .....	1,600	16
1,600 .....	4,500	18
4,500 .....	50,000	20
50,000 .....	.....	22

### § 108.441 Piping and discharge rates for CO<sub>2</sub> systems.

(a) The size of branch lines to spaces protected by a CO<sub>2</sub> system must meet Table 108.441.

(b) Distribution piping within a space must be proportioned from the supply line to give proper distribution to the outlets without throttling.

(c) The number, type, and location of discharge outlets must distribute the CO<sub>2</sub> uniformly throughout the space.

TABLE 108.441—CO<sub>2</sub> System Pipe Size

CO <sub>2</sub> supply in system, kilograms (pounds)	Minimum pipe size (inches), millimeters (inches)
45 (100) .....	12.7 (½).
104 (225) .....	19.05 (¾).
136 (300) .....	25.4 (1).
272 (600) .....	31.75 (1¼).
450 (1,000) .....	38.10 (1½).
1,110 (2,450) .....	50.80 (2).
1,130 (2,500) .....	63.5 (2½).
2,023 (4,450) .....	76.2 (3).
3,229 (7,100) .....	88.9 (3½).
4,750 (10,000) .....	101.6 (4).
6,818 (15,000) .....	114.3 (4½).

(d) The total area of all discharge outlets must be more than 35 percent and less than 85 percent of the nominal cylinder outlet area or the area of the supply pipe, whichever is smaller. The nominal cylinder outlet area in square centimeters is determined by multiplying the factor 0.0313 by the number of kilograms of CO<sub>2</sub> required. (The nominal cylinder outlet area in square inches is determined by multiplying the factor 0.0022 by the number of pounds of CO<sub>2</sub> required). The nominal cylinder outlet area must not be less than 71 square millimeters (0.110 square inches).

(e) A CO<sub>2</sub> system must discharge at least 85 percent of the required amount within 2 minutes.

#### § 108.443 Controls and valves.

(a) At least one control for operating a CO<sub>2</sub> system must be outside the space or spaces that the system protects and in a location that would be accessible if a fire occurred in any space that the system protects. Control valves must not be located in a protected space unless the CO<sub>2</sub> cylinders are also in the protected space.

(b) A CO<sub>2</sub> system that protects more than one space must have a manifold with a stop valve, the normal position of which is closed, that directs the flow of CO<sub>2</sub> to each protected space.

(c) A CO<sub>2</sub> system that protects only one space must have a stop valve installed between the cylinders and the discharge outlets in the system, except on a system that has a CO<sub>2</sub> supply of 136 kilograms (300 pounds) or less.

(d) At least one of the control stations in a CO<sub>2</sub> system that protects a machinery space must be as near as

practicable to one of the main escapes from that space.

(e) All distribution valves and controls must be of an approved type.

(f) Each CO<sub>2</sub> system that has a stop valve must have a remote control that operates only the stop valve and must have a separate remote control for releasing the required amount of CO<sub>2</sub> into the space protected by the system.

(g) Each CO<sub>2</sub> system that does not have a stop valve must be operated by a remote control that releases the required amount of CO<sub>2</sub> into the space protected by the system.

(h) Remote controls to each space must be in an enclosure.

(i) Each system must have a manual control at its cylinders for releasing CO<sub>2</sub> from the cylinders, except that if the system has pilot cylinders, a manual control is not required for other than pilot cylinders.

(j) If gas pressure is used to release CO<sub>2</sub> from a system having more than 2 cylinders, the system must have at least 2 pilot cylinders to release the CO<sub>2</sub> from the remaining cylinders.

(k) If the entrance to a space containing the CO<sub>2</sub> supply or controls of a CO<sub>2</sub> system has a lock, the space must have a key to the lock in a break-glass type box that is next to and visible from the entrance.

#### § 108.445 Alarm and means of escape.

(a) Each CO<sub>2</sub> system that has a supply of more than 136 kilograms (300 pounds) of CO<sub>2</sub>, except a system that protects a tank, must have an alarm that sounds for at least 20 seconds before the CO<sub>2</sub> is released into the space.

(b) Each audible alarm for a CO<sub>2</sub> system must have the CO<sub>2</sub> supply for the system as its source of power and must be in a visible location in the spaces protected.

#### § 108.447 Piping.

(a) Each pipe, valve, and fitting in a CO<sub>2</sub> system must have a bursting pressure of at least 420 kilograms per square centimeter (6,000 pounds per square inch).

(b) All piping for a CO<sub>2</sub> system of nominal size of 19.05 millimeters (¾ inch) inside diameter or less must be at least Schedule 40 (standard weight) and all piping of nominal size over 19.05